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ABSTRACT

This study examined the effects of computer experience, age, and sex on attitudes toward computers among 142 high school language arts students, 107 community college mathematics students, and 105 students living in dormitories at a small liberal arts college. Computer attitudes (computer anxiety, computer confidence, and computer liking) were measured by the Computer Attitude Scale (Loyd and Gressard, 1984), which was administered by the teachers, instructors, and dormitory supervisors. The instrument provides three subscales of 10 items each and presents positively and negatively worded statements such as, "Computers make me feel nervous and uncomfortable," with a four-point response scale. Results showed that the students, as a whole, had fairly positive attitudes toward computers. Computer experience was significantly related to more positive attitudes on all three subscales. Significant age effects were found for the subscale "computer liking," but no clear trend for age was demonstrated. Sex was not significantly related to computer attitudes on any of the three subscales. Seven tables and a five-item reference list are included. (Author/LMM)

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The Effects of Sex, Age, and Computer Experience on Computer Attitudes

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Abstract

Student attitudes toward computers are important to success in computer-related programs. This study of 254 high school, community college, and college students examines the effects of age, sex, and computer experience on the attitudes (computer anxiety, confidence, and liking) measured by the Computer Attitude Scale (Loyd & Gressard, 1984).

Computer experience was found to be significantly related to more positive attitudes on all three subscales. Some significant age effects were also found, but no clear trend with age was demonstratable. Sex was not found to be significantly related to computer attitudes on any of the three subscales. Interaction effects were also examined.

The Effects of Sex, Age, and Computer Experience on Computer Attitudes

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The role of computers in our society has expanded dramatically in recent years, and it is becoming increasingly evident that familiarity with computers and the ability to use them effectively will be of critical importance to success in many different fields. Computer experience is therefore gaining wide recognition as a crucial component of the educational process, as our educational system seeks to prepare new generations of students for effective participation in our society. Designers of school curricula generally no longer debate whether computers should be introduced into our classrooms; the discussion now tends to focus on when they should be introduced and how they should be used in the educational environment.

When computers are introduced into the classroom, many students respond enthusiastically and quickly master the skills necessary for successful utilization of computers. Clement (1981) reports that in general student attitudes toward computer-based courses have been found

to be positive among students in junior high school, high school, community college, and college. These positive attitudes toward computers make the interaction with computers a pleasant and rewarding experience.

There are some students, however, for whom computer experience is extremely unpleasant. These students exhibit varying degrees of anxiety when required to learn about or use computers, and therefore have more than the usual difficulty in mastering computer skills. Jay (1981) describes these negative attitudes as computer anxiety or "computerphobia." They represent negative attitudes toward technology which may take the form of resistance to thinking about computer technology, fear of computers, and hostile or aggressive thoughts toward computers. Attitudes such as these may inhibit successful mastery of computer skills in much the same way that math anxiety (Fennema & Sherman, 1978) inhibits achievement in mathematics.

Unfortunately, the existence of computer anxiety has most often been proposed anecdotally, from observation of the difficulties of individual students (Jay, 1981). Empirical studies which could add to our understanding of this phenomenon have been rare. Lawton and Gershner (1982) reviewed the literature on attitudes toward

computers, intending originally to focus on empirical studies; however, a literature search revealed so few empirical studies on the topic that the review had to be expanded to include any reference to computer attitudes. While the expanded review was useful in examining current literature on attitudes toward computers, computerized instruction, and issues related to computer literacy, it also further demonstrated the need for empirical studies of these matters.

This study seeks to address this need through an empirical study of computer attitudes among high school and college students. Three types of attitudes toward computers were considered important enough to have a significant effect on student achievement: (1) computer anxiety, consisting of anxiety toward or fear of computers or learning to use computers; (2) computer confidence, related to confidence in the ability to learn about or use computers; and (3) computer liking, meaning enjoyment or liking of computers and using computers. As computer literacy and computer use become more important in the educational environment, these attitudes may play a decisive role in student success in computer-related components of the curriculum. Positive attitudes increase the prospects for achievement in any academic endeavor,

and negative attitudes make achievement of competency less likely; empirical study of the relationships among these attitudes will help us to understand more fully the character and significance of computer attitudes among students.

Factors such as age, sex, and computer experience may also be related to computer attitudes; these variables will also receive attention in this study. The amount of experience with computers would be expected to be a significant factor in computer attitudes because anxiety is produced in part by lack of familiarity; as students become more familiar with computers, we would expect computer anxiety to decrease, and computer liking and computer confidence to increase. Age may also be a significant factor in computer attitudes, because of the different developmental and socialization characteristics of different age groups which may play a role in receptivity to computer-related instruction, and because curricula in general are sensitive to such age-related differences. Finally, sex requires careful consideration as a possible factor in computer attitudes, because sex-related differences have been shown in the prominence and intensity of math anxiety, and because a number of non-empirical accounts based on observation have claimed

that females are more likely than males to exhibit computer anxiety and therefore require special attention.

The purpose of this study is to examine computer anxiety, computer confidence, and computer liking among high school, community college, and college students, and to explore the possible effects of computer experience, age, and sex on these computer attitudes.

Methodology

A total of 354 students participated in the study. Of this total, 142 were high school students from a large school district, who were enrolled in language arts courses; and 107 were community college students, who were enrolled in mathematics courses; and 105 were students at a small liberal arts college, who were living in dormitories. The students selected at each level represented a broad spectrum of backgrounds and academic interests. Previous experience with computers also varied widely within each group; at each level there was a significant proportion of students who had no previous computer experience, and a significant proportion of students who had at least six months of experience with computers prior to the study. The instrument for this study was administered respectively by the teachers, instructors, and dormitory supervisors

Each student was administered the Computer Attitude Scale (Loyd and Gressard, 1984), an instrument which measures attitudes toward learning about and using computers. The instrument provides for scores on three subscales: Computer Anxiety, Computer Confidence, and Computer Liking. Each subscale consists of ten items and presents positively and negatively worded statements such as "Computers make me feel nervous and uncomfortable" or "Computers do not scare me at all." Students responded to the statements by selecting one of four responses ranging from "agree" to "disagree." Information on age, sex, and computer experience was also obtained for each student.

Three scores were computed for each student, one score for each of the three subscales. Higher scores on the Computer Anxiety subscale correspond to lower anxiety, while higher scores on the Computer Confidence and Computer Liking subscales correspond to a greater degree of confidence and liking, respectively. In general, a higher score corresponds to a more positive attitude toward working with and learning about computers.

To examine the nature of these computer attitudes, means and standard deviations were computed for each of the three scores. Analysis of variance procedures were

used to assess the impact of age, sex, and computer experience on computer attitudes.

Three-factor analysis of variance procedures were used. The first factor was sex (male or female). The second factor, age, was divided into four levels: 13-15, 16-18, 19-20, and 21 or over. The third factor, computer experience, was divided into three levels: less than one week (little or no experience with computers); one week to six months (some computer experience); and more than six months (substantial experience with computers).

Three analysis of variance procedures were completed, corresponding to the three subscales of the Computer Attitude Scale administered. In the first procedure, computer anxiety was the dependent variable; in the second, the dependent variable was computer confidence; and in the third, the dependent variable was computer liking.

Each analysis of variance was tested at the .05 level of significance and the experiment-wise α-level was considered to be approximately .15. Although all levels of interaction were examined, the main effects of sex, age, and computer experience were of special concern and were examined in addition to the simple effects.

Results

The means of the total group of students, and of the subgroups specified by age and computer experience, are presented for each of the subscales of the Computer Attitude Scale (Computer Anxiety, Computer Confidence, and Computer Liking) in Tables 1, 2, and 3, respectively. On each subscale, scores can range from 10 to 40. For the Computer Anxiety subscale, the mean for the entire group was 31.5 and the standard deviation was 6.3 For the Computer Confidence subscale, the mean for the entire group was 29.7 and the standard deviation was 6.8. For the Computer Liking subscale, the mean for the entire group was 30.5 and the standard deviation was 7.1.

Insert Tables 1, 2, and 3 about here.

Summaries of the three analysis of variance procedures using, respectively, computer anxiety, computer confidence, and computer liking as the dependent variable are presented in Tables 4, 5, and 6. The results of the analysis of variance procedures indicate a significant main effect for computer experience for all three dependent variables. The main effect of age was found to be statistically significant only for computer liking. The

main effect of sex was not found to be statistically significant in any of the three analyses. The only second or third order interaction found to be statistically significant was the age by computer experience interaction. This interaction was found to be statistically significant for computer confidence and computer liking but not for computer anxiety.

Insert Tables 4, 5, and 6 about here.

The results of the first analysis of variance procedure, using computer anxiety as the dependent variable (Table 4), indicated that only the main effect for computer experience was statistically significant. Follow-up procedures indicated that students with little or no computer experience (less than one week) were significantly more anxious about computers than those with some experience with computers (one week to six months) or those with substantial computer experience (more than six months). Students with more than six months of computer experience were significantly less anxious about computers than those with less than six months of experience with computers.

The results of the second analysis of variance procedure, using computer confidence as the dependent variable (Table 5), indicated a significant main effect for computer experience and a significant interaction between age and computer experience. Follow-up procedures for the main effect indicated statistically significant differences among all three levels of computer experience. Students with more computer experience were significantly more confident than those with less experience with computers. Follow-up procedures for the interaction effect indicated that among students with less than one week of computer experience, those 21 or older were significantly more confident than those 16 to 18 years old. Among students with some computer experience (one week to six months), those 21 or older were significantly more confident than those 13 to 15 years old. Among students with more than six months of computer experience, there were no statistically significant differences among the four age groups.

The results of the third analysis of variance procedure, using computer liking as the dependent variable (Table 6), indicated significant main effects for age and for computer experience. Follow-up procedures for the main effects indicated that students with more computer experience had significantly higher scores on the Computer Liking subscale than those with less computer experience, and that students 13 to 15 years old had significantly

higher scores on the Computer Liking subscale than students in each of the other three age groups. Follow-up procedures for the interaction effect indicated that among students with less than one week of computer experience, students 13 to 15 years old had significantly higher scores on the Computer Liking subscale than students in each of the other three age groups; among students with one week to six months of computer experience, there were no significant differences among the four age groups; and among students with more than six months of computer experience, students 13 to 15 years old had significantly higher scores on the Computer Liking subscale than students 21 or older.

It is also of interest to note that none of the main effects or interaction effects involving sex as a variable were statistically significant. Means and standard deviations for each sex group on each of the three dependent variables (computer anxiety, computer confidence, and computer liking) are presented in Table 7.

Insert Table 7 about here.

Discussion

In general, the results suggest that the students as a whole had fairly positive attitudes toward computers.

On all three subscales of the Computer Attitude Scale, the average scores were around 30 on a 40-point scale where a score of 25 would indicate a neutral attitude toward computers.

Computer experience was found to be a major factor in all three computer attitudes (computer anxiety, computer confidence, and computer liking), with more computer experience corresponding to more positive computer attitudes. Because the amount of computer experience was merely reported and neither the amount nor the nature of computer experience was experimentally controlled, it was not possible to determine whether more computer experience directly causes more positive computer attitudes (although this would be hypothesized to be the case), or if more positive computer attitudes cause students to seek and find opportunities for more computer experience. However, if the hypothesis is correct that computer experience leads to more positive computer attitudes, then these results would suggest that computer experience be provided as early as possible within school curricula and that students be given opportunities to increase their familiarity with computers from grade to grade.

The differences in computer confidence reported in this study could be a reflection of the increased general

academic confidence which tends to emerge as one progresses from high school to college, but a trend is not well-defined by the data in this study.

The differences observed in computer liking may be a reflection of younger students (13 to 15 years old) associating computers with video games. Again the data do not suggest a clear trend with age of increase or decrease in computer liking.

Finally, an important result by its lack of significant finding is that there is no evidence from this study to indicate differences between sex groups on computer attitudes. Statistical analysis reveals little to suggest that computer attitudes of males and females are different in any respect, and examination of the average scores by males and females on the three subscales of the Computer Attitude Scale would suggest that computer anxiety, computer confidence, and computer liking are all quite similar for males and females in this sample. The lack of a significant finding related to sex, while in no sense conclusive, should at least leave open the possibility that females may be just as interested as males in computers, and that females do not necessarily have more anxiety than males about working with computers.

Table 1

Means of Computer Anxiety Scores by

Computer Experience and Age

	Computer Experience			
Age in Years	Less than 1 week	1 week to 6 months	More than 6 months	Total
13-15	30.11 (N=13)	31.34 (N=62)	35.14 (N=47)	32.67 (N=122)
16-18	27.80 (N=24)	32.37 (N=34)	36.90 (N=6)	31.08 (N=64)
19-20	28.49 (N=40)	31.21 (N=20)	36.10 (N=15)	30.74 (N=75)
Over 21	30.25 (N=43)	33.71 (N=27)	34.49 (N=23)	32.30 (N=93)
Total	29.16 (N=120)	32.01 (N=143)	35.25 (N=91)	31.88 (N=354)

Table 2

Means of Computer Confidence Scores by Computer Experience and Age

Age in years	Computer Experience: Less than 1 week	1 week to 6 months	More than 6 months	Total
13-15	29.23 (N=13)	28.81 (N=62)	33.72 (N=47)	30.75 (N=122)
16-18	23.93 (N=24)	31.26 (N=34)	33.45 (N=6)	28.72 (N=64)
19-29	25.74 (N=40)	30.39 (N=20)	35.50 (N=15)	28.93 (N=75)
Over 21	28.32 (N=40)	32.92 (N=27)	33.49 (N=23)	30.93 (N=93)
Total	26.68 (N=120)	30.39 (N=143)	33.94 (N=91)	30.04 (N=354)

Table 3

Means of Computer Liking Scores by

Computer Experience and Age

	Computer Experience			
Age in years	Less than 1 week	1 week to 6 months	More than 6 months	Total
13-15	32.36 (N=13)	30.09 (N=62)	36.46 (N=47)	32.79 (N=122)
16-18	24.11 (N=24)	32.94 (N=34)	31.55 (N=6)	29.50 (N=64)
19-20	26.63 (N=40)	29.26 (N=20)	34.29 (N=15)	28.86 (N=75)
Over 21	28.01 (N=43)	31.78 (N=27)	32.93 (N=23)	30.32 (N=93)
Total	27.24 (N=120)	30.97 (N=143)	34.88 (N=91)	30.71 (N=354)

Table 4

ANOVA Summary for Computer Anxiety

Source	df	MS	F
Age	3	15.9	.49
Sex	1	1.5	.05
Computer experience	2	535.1	16.5*
Age x sex	3	2.6	.08
Age x computer experience	6	30.6	.94
Sex x computer experience	2	10.4	.32
Age x sex x computer experience	6	39.0	.32
Error	330	32.5	

*p < .05

Table 5

ANOVA Summary for Computer Confidence

Source	df	MS	F
Age	3	31.5	.85
Sex	1	16.8	.45
Computer experience	2	825.3	22.24*
Age x sex	3	6.3	.17
Age x computer experience	6	86.9	2.34*
Sex x computer experience	2	1.0	.03
Age x sex x computer experience	6	29.9	.81
Error	330	37.1	

*$p < .05$

Table 6

ANOVA Summary for Computer Liking

Source	df	MS	F
Age	3	120.2	3.11*
Sex	1	7.9	.21
Computer experience	2	512.1	13.27*
Age x sex	3	12.2	.32
Age x computer experience	6	135.5	3.51*
Sex x computer experience	2	25.9	.67
Age x sex x computer experience	6	28.6	.74
Error	330	38.6	

*P < .05

Table 7

Means and Standard Deviations

of Computer Anxiety, Computer

Confidence, and Computer Liking Scores by Sex

		Computer Anxiety	Computer Confidence	Computer Liking
Males (N=137)	$\bar{X}$	32.16	30.42	29.50
	SD	6.35	6.34	6.73
Females (N=217)	$\bar{X}$	31.70	29.80	28.49
	SD	6.24	7.14	7.37

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